New England Common Assessment Program

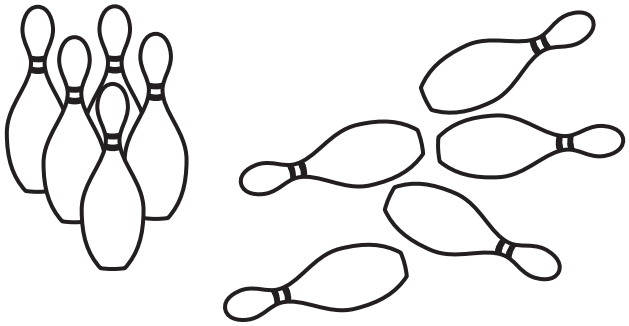
Released Items 2009

Grade 6 Mathematics

Mathematics

Items with this symbol were selected from Session One—no calculators or other mathematics tools allowed.

1 The picture below shows bowling pins.



What percent of the bowling pins are standing?

A. 5%
B. 10%
C. 25%
D. 50%

2 This table shows the unit price of four different brands of peanut butter.

Brand Name	Unit Price
Grand Nutty	$0.078
Hinkman's	$0.08
Wholesome	$0.081
Jolly Butter	$0.079

Which brand of peanut butter has the **lowest** unit price?

A. Grand Nutty
B. Hinkman's
C. Wholesome
D. Jolly Butter

3 Roberta cut a 95-inch board of wood into 14-inch sections. How many 14-inch sections did she cut?

A. 5
B. 6
C. 7
D. 8

4 Stewart needs to cut $\frac{3}{4}$ cup of carrots for a salad. He has already cut $\frac{1}{2}$ cup of carrots. How much more does Stewart need to cut?

A. $\frac{1}{8}$ cup of carrots
B. $\frac{1}{4}$ cup of carrots
C. $\frac{2}{6}$ cup of carrots
D. $\frac{1}{2}$ cup of carrots

5 A mouse has a resting heart rate of 400 beats per minute. An elephant has a resting heart rate of 40 beats per minute. In one hour at rest, how many more beats does a mouse's heart make than an elephant's heart?

A. 600
B. 2,160
C. 21,600
D. 22,400

6 Look at Figure P.

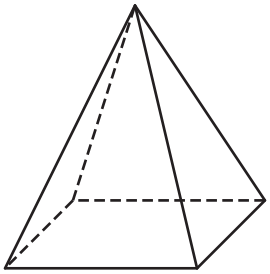
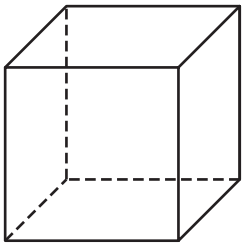


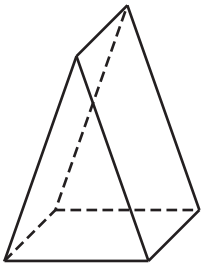
Figure P

Which figure has the same number of faces as Figure P?

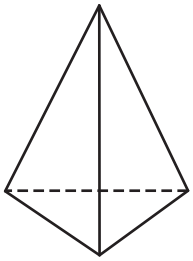
A.



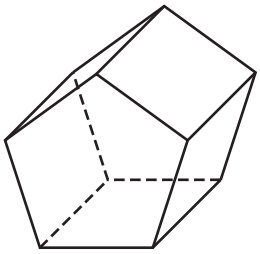
B.



C.



D.



7 Look at this table.

Input	Output
3	12
5	20
?	36
12	48

What is the input when the output is 36?

A. 6

B. 7

C. 8

D. 9

8 The student council used the expression $4 \cdot n - 30$ to calculate the profit (in dollars) they earned by selling n pieces of pie at a bake sale. The student council sold 38 pieces of pie at the bake sale. How much profit did the student council earn?

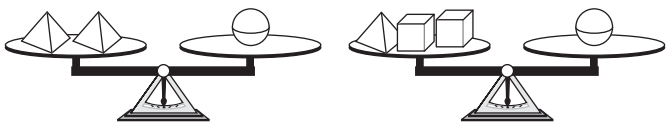
A. $ 12

B. $ 32

C. $122

D. $182

9 The two scales shown below are balanced.



Each ◇ weighs the same. Each ⬭ weighs the same. Each □ weighs the same. Which list gives the shapes in order from lightest to heaviest?

A. □ ◇ ⬭

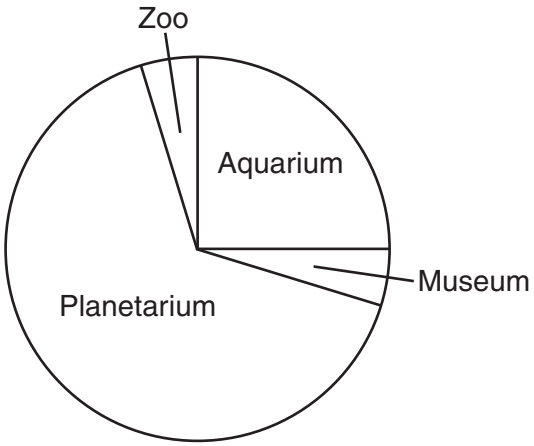
B. ◇ □ ⬭

C. ⬭ □ ◇

D. □ ⬭ ◇

10 Ms. Jordan surveyed her students about their favorite class trip. She displayed the results in this circle graph.

Favorite Class Trip



About what percent of Ms. Jordan's students chose the planetarium as their favorite class trip?

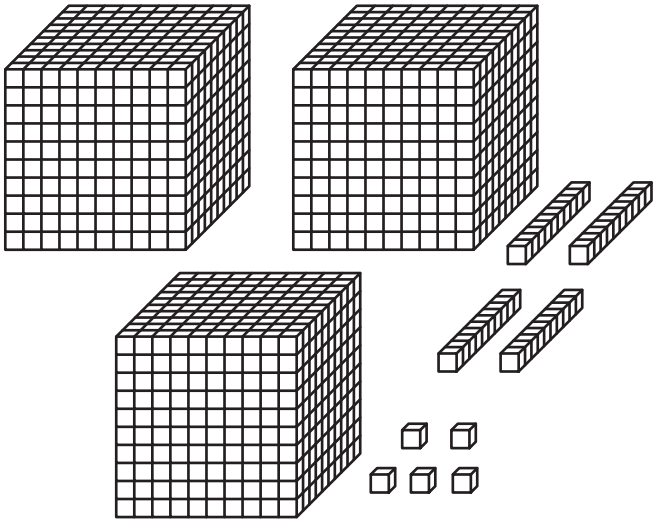
A. 25%

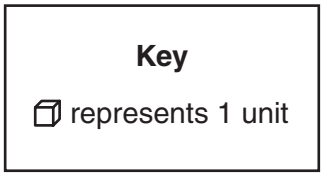
B. 55%

C. 65%

D. 75%

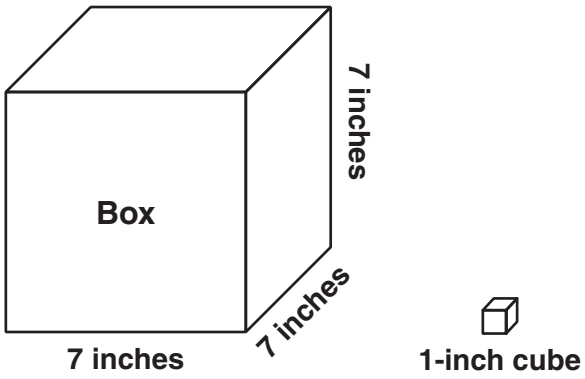
11 Look at these blocks.





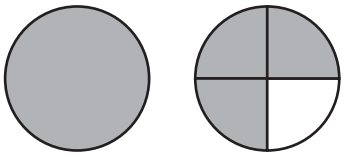
What is the value of these blocks?

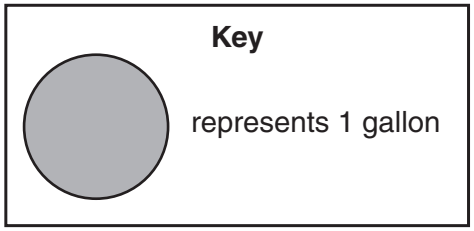
12 Look at the box and the 1-inch cube.



What is the greatest number of 1-inch cubes that can fit into the box?

13 Look at this picture.





The picture shows the number of gallons of water the Mitchell family drank in one day.

a. Write a mixed number that represents the number of gallons the Mitchell family drank.

b. One full glass holds $\frac{1}{8}$ gallon of water. The Mitchell family drank only full glasses of water on that day. How many full glasses of water did the Mitchell family drink?

14 Lisa made this list to show the ages, in years, of twelve children at a park.

6, 10, 4, 2, 3, 2, 14, 5, 1, 2, 5, 9

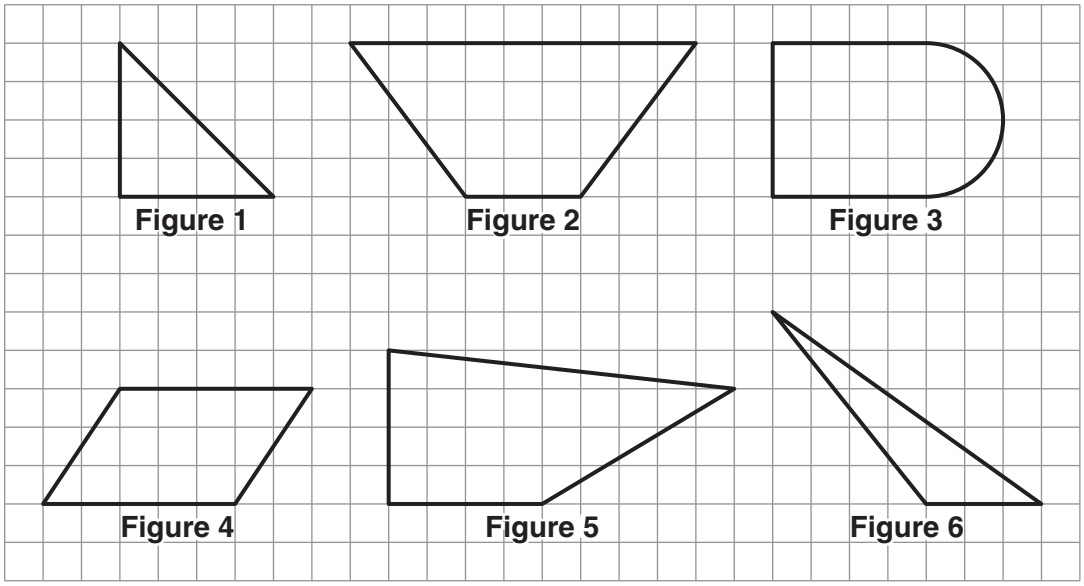
a. What is the range of ages of these twelve children?

Lisa made this statement.

> The range of ages of students in grades 4, 5, and 6 at a school is greater than the range of ages of the children at the park.

b. Explain why Lisa's statement is correct **or** why Lisa's statement is incorrect.

15 Look at the figures on this grid.



Jill gave these three clues about one of the figures.

- Clue 1: It is a polygon.
- Clue 2: It has **exactly one** pair of congruent sides.
- Clue 3: It contains **at least one** obtuse angle.

a. Which **two** figures fit all three of Jill's clues?

b. Write a fourth clue that Jill could give so that **only one** figure would fit all four clues.

Mathew gave exactly two clues about Figure 6. Figure 6 is the only figure that fits his two clues.

c. What could be the **two** clues that Mathew gave?

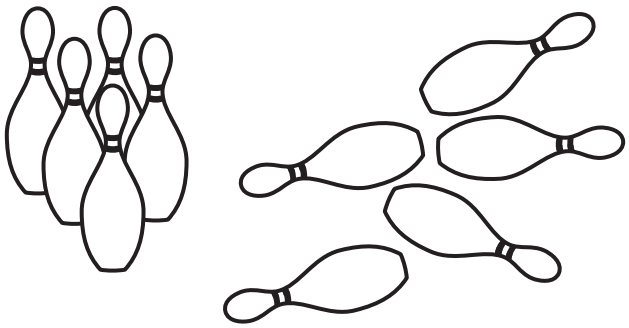
New England Common Assessment Program

Released Items Support Materials 2009

Grade 6 Mathematics

N&O 5.1 **Demonstrates conceptual understanding of rational numbers with respect to: whole numbers** from 0 to 9,999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (proper, mixed number, and improper) (halves, fourths, eighths, thirds, sixths, twelfths, fifths, or powers of ten (10, 100, 1000)), **decimals** (to thousandths), or **benchmark percents** (10%, 25%, 50%, 75% or 100%) as a part to whole relationship in area, set, or linear models **using models, explanations, or other representations**.

1 The picture below shows bowling pins.



What percent of the bowling pins are standing?

A. 5%
B. 10%
C. 25%
D. 50%

N&O 5.2 **Demonstrates understanding of the relative magnitude of numbers** by ordering, comparing, or identifying equivalent positive fractional numbers, decimals, or benchmark percents within number formats (fractions to fractions, decimals to decimals, or percents to percents); or integers in context using models or number lines.

2 This table shows the unit price of four different brands of peanut butter.

Brand Name	Unit Price
Grand Nutty	$0.078
Hinkman's	$0.08
Wholesome	$0.081
Jolly Butter	$0.079

Which brand of peanut butter has the **lowest** unit price?

A. Grand Nutty
B. Hinkman's
C. Wholesome
D. Jolly Butter

N&O 5.3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the meaning of a remainder with respect to division of whole numbers using models, explanations, or solving problems.

3 Roberta cut a 95-inch board of wood into 14-inch sections. How many 14-inch sections did she cut?

A. 5
B. 6
C. 7
D. 8

N&O 5.4 **Accurately solves problems involving** multiple operations on whole numbers or the use of the properties of factors, multiples, prime, or composite numbers; and addition or subtraction of fractions (proper) and decimals to the hundredths place. (Division of whole numbers by up to a two-digit divisor.) (IMPORTANT: *Applies the conventions of order of operations with and without parentheses*.)

4 Stewart needs to cut $\frac{3}{4}$ cup of carrots for a salad. He has already cut $\frac{1}{2}$ cup of carrots. How much more does Stewart need to cut?

A. $\frac{1}{8}$ cup of carrots
B. $\frac{1}{4}$ cup of carrots
C. $\frac{2}{6}$ cup of carrots
D. $\frac{1}{2}$ cup of carrots

N&O 5.4 **Accurately solves problems involving** multiple operations on whole numbers or the use of the properties of factors, multiples, prime, or composite numbers; and addition or subtraction of fractions (proper) and decimals to the hundredths place. (Division of whole numbers by up to a two-digit divisor.) (IMPORTANT: *Applies the conventions of order of operations with and without parentheses*.)

5 A mouse has a resting heart rate of 400 beats per minute. An elephant has a resting heart rate of 40 beats per minute. In one hour at rest, how many more beats does a mouse's heart make than an elephant's heart?

A. 600
B. 2,160
C. 21,600
D. 22,400

G&M 5.3 **Uses properties or attributes** (shape of bases, number of lateral faces, or number of bases) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).

6 Look at Figure P.

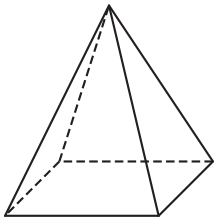
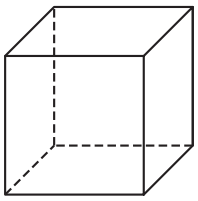
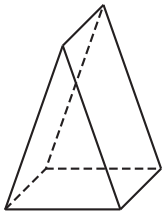
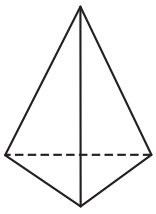


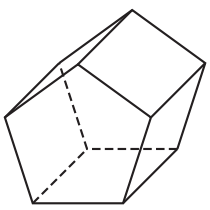
Figure P

Which figure has the same number of faces as Figure P?

A. 

B. 

C. 

D. 

F&A 5.1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, or in problem situations; and writes a rule in words or symbols for finding specific cases of a linear relationship.

7 Look at this table.

Input	Output
3	12
5	20
?	36
12	48

What is the input when the output is 36?

A. 6
B. 7
C. 8
D. 9

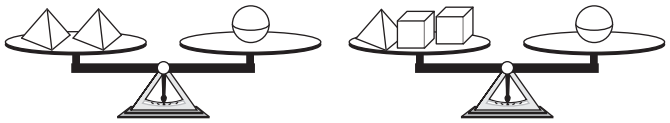
F&A 5.3 **Demonstrates conceptual understanding of algebraic expressions** by using letters to represent unknown quantities to write linear algebraic expressions involving any two of the four operations; or by evaluating linear algebraic expressions using whole numbers.

8 The student council used the expression $4 \cdot n - 30$ to calculate the profit (in dollars) they earned by selling n pieces of pie at a bake sale. The student council sold 38 pieces of pie at the bake sale. How much profit did the student council earn?

A. $ 12
B. $ 32
C. $122
D. $182

F&A 5.4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M(F&A)–5–3), by solving one-step linear equations of the form $ax = c$, $x \pm b = c$, or $x/a = c$, where a, b, and c are whole numbers with $a \neq 0$; or by determining which values of a replacement set make the equation (multi-step of the form $ax \pm b = c$ where a, b, and c are whole numbers with $a \neq 0$) a true statement (e.g., $2x + 3 = 11$, $\{x: x = 2, 3, 4, 5\}$).

9 The two scales shown below are balanced.



Each ◇ weighs the same. Each ⬭ weighs the same. Each ▱ weighs the same. Which list gives the shapes in order from lightest to heaviest?

A. ▱ ◇ ⬭

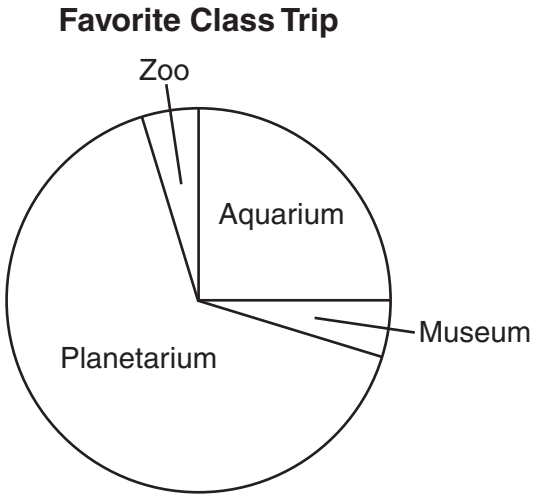
B. ◇ ▱ ⬭

C. ⬭ ▱ ◇

D. ▱ ⬭ ◇

DSP 5.1 **Interprets a given representation** (tables, bar graphs, circle graphs, or line graphs) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in M(DSP)–5–2.*)

10 Ms. Jordan surveyed her students about their favorite class trip. She displayed the results in this circle graph.

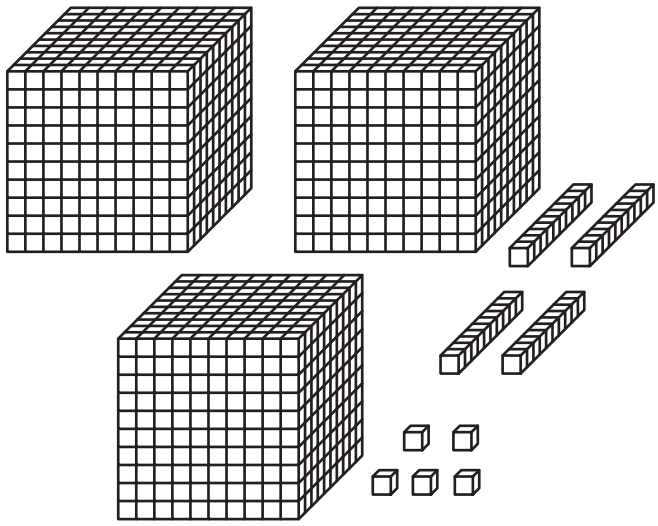


About what percent of Ms. Jordan's students chose the planetarium as their favorite class trip?

A. 25%
B. 55%
C. 65%
D. 75%

N&O 5.1 **Demonstrates conceptual understanding of rational numbers with respect to: whole numbers** from 0 to 9,999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (proper, mixed number, and improper) (halves, fourths, eighths, thirds, sixths, twelfths, fifths, or powers of ten (10, 100, 1000)), **decimals** (to thousandths), or **benchmark percents** (10%, 25%, 50%, 75% or 100%) as a part to whole relationship in area, set, or linear models **using models, explanations, or other representations**.

11 Look at these blocks.



Key

represents 1 unit

What is the value of these blocks?

Scoring Guide

Score	Description
1	for correct answer, **3,045**
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

SCORE POINT 1
(EXAMPLE A)

11

three thousand forty five

The student's response is correct.

SCORE POINT 1
(EXAMPLE B)

11

There are 3,045 blocks in the picture.

The student's response is correct.

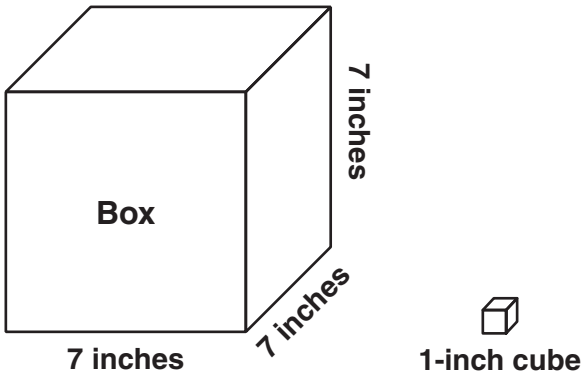
SCORE POINT 0
(EXAMPLE A)

11

The student's response is incorrect.

G&M 5.6 **Demonstrates conceptual understanding of perimeter** of polygons, **and the area of** rectangles or right triangles through models, manipulatives, or formulas, the area of polygons or irregular figures on grids, **and volume of** rectangular prisms (cubes) using a variety of models, manipulatives, or formulas. Expresses all measures using appropriate units.

12 Look at the box and the 1-inch cube.



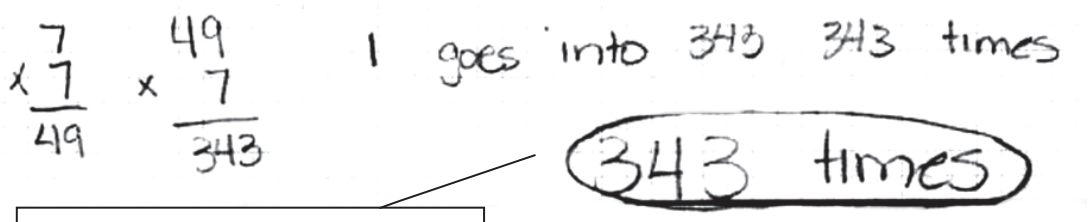
What is the greatest number of 1-inch cubes that can fit into the box?

Scoring Guide

Score	Description
1	for correct answer, **343**
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Score Point 1
(Example A)

12



The student's response is correct. (Explanation is not required.)

Score Point 1
(Example B)

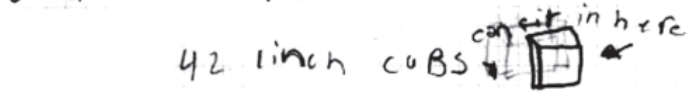
12

343

The student's response is correct.

Score Point 0
(Example A)

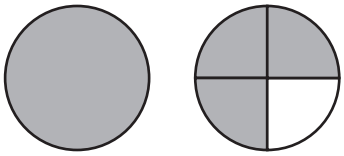
12

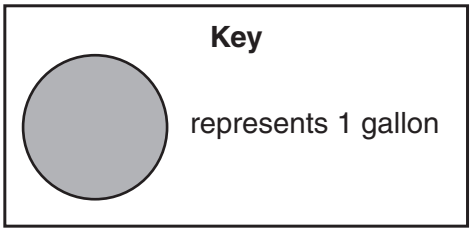


The student's response is incorrect.

N&O 5.1 **Demonstrates conceptual understanding of rational numbers with respect to: whole numbers** from 0 to 9,999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (proper, mixed number, and improper) (halves, fourths, eighths, thirds, sixths, twelfths, fifths, or powers of ten (10, 100, 1000)), **decimals** (to thousandths), or **benchmark percents** (10%, 25%, 50%, 75% or 100%) as a part to whole relationship in area, set, or linear models **using models, explanations, or other representations**.

13 Look at this picture.





The picture shows the number of gallons of water the Mitchell family drank in one day.

a. Write a mixed number that represents the number of gallons the Mitchell family drank.

b. One full glass holds $\frac{1}{8}$ gallon of water. The Mitchell family drank only full glasses of water on that day. How many full glasses of water did the Mitchell family drink?

Scoring Guide

Score	Description
2	for correct answer to part a, $\mathbf{1\frac{3}{4}}$ (gallons), and part b, **14**
1	for correct answer to part a or for correct answer to part b
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Score Point 2
(Example A)

13

A. $1\frac{3}{4}$ gallons.

B. 14 Full glasses of water.

a) The student's response is correct.

b) The student's response is correct. (Showing work is not required.)

Score Point 2
(Example B)

13

a. 1 3/4

B. 14 glasses

a) The student's response is correct.

b) The student's response is correct.

Score Point 1
(Example A)

13

A. 1 3/4 gallons

B 1 6/8 gallons

a) The student's response is correct.

b) The student's response is incorrect.

Score Point 1
(Example B)

13

They drank 14 full glasess of water that day.

b) The student's response is correct.

a) The student did not attempt.

Score Point 0
(Example A)

13

a= 1 1/4 gallons

b= 4

a) The student's response is incorrect.

b) The student's response is incorrect.

DSP 5.2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode) or range to analyze situations, or to solve problems.

14 Lisa made this list to show the ages, in years, of twelve children at a park.

6, 10, 4, 2, 3, 2, 14, 5, 1, 2, 5, 9

a. What is the range of ages of these twelve children?

Lisa made this statement.

> The range of ages of students in grades 4, 5, and 6 at a school is greater than the range of ages of the children at the park.

b. Explain why Lisa's statement is correct **or** why Lisa's statement is incorrect.

Scoring Guide

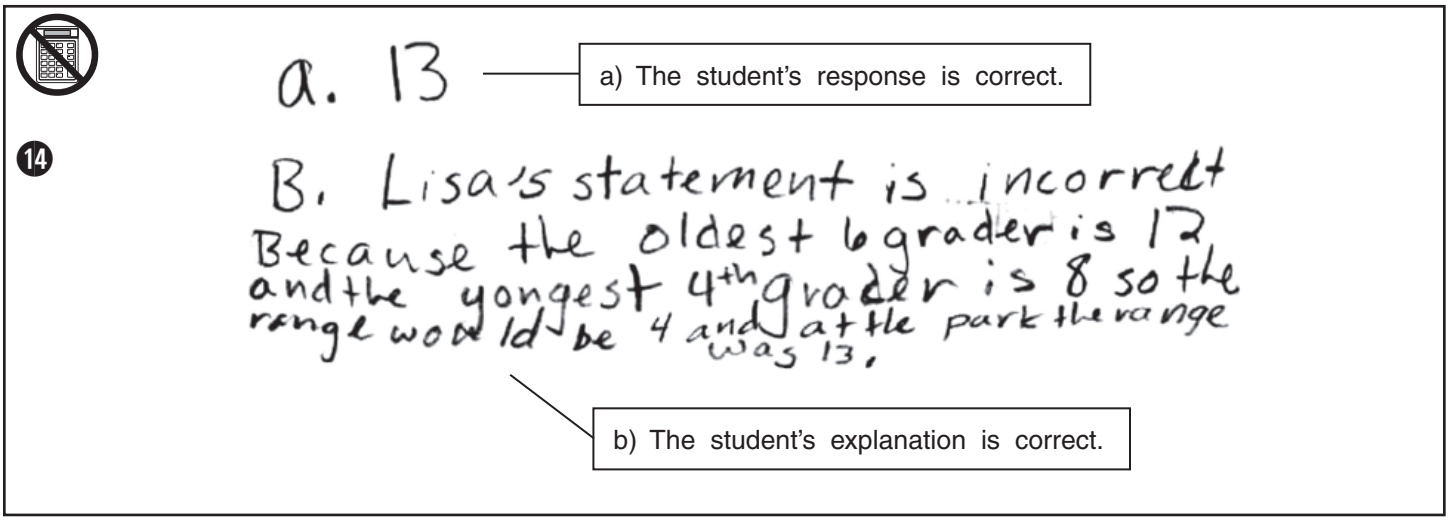
Score	Description
2	for correct answer to part a, **13** or **1 to 14**, and sufficient explanation in part b
1	for correct answer to part a or for sufficient explanation in part b
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Sample Response

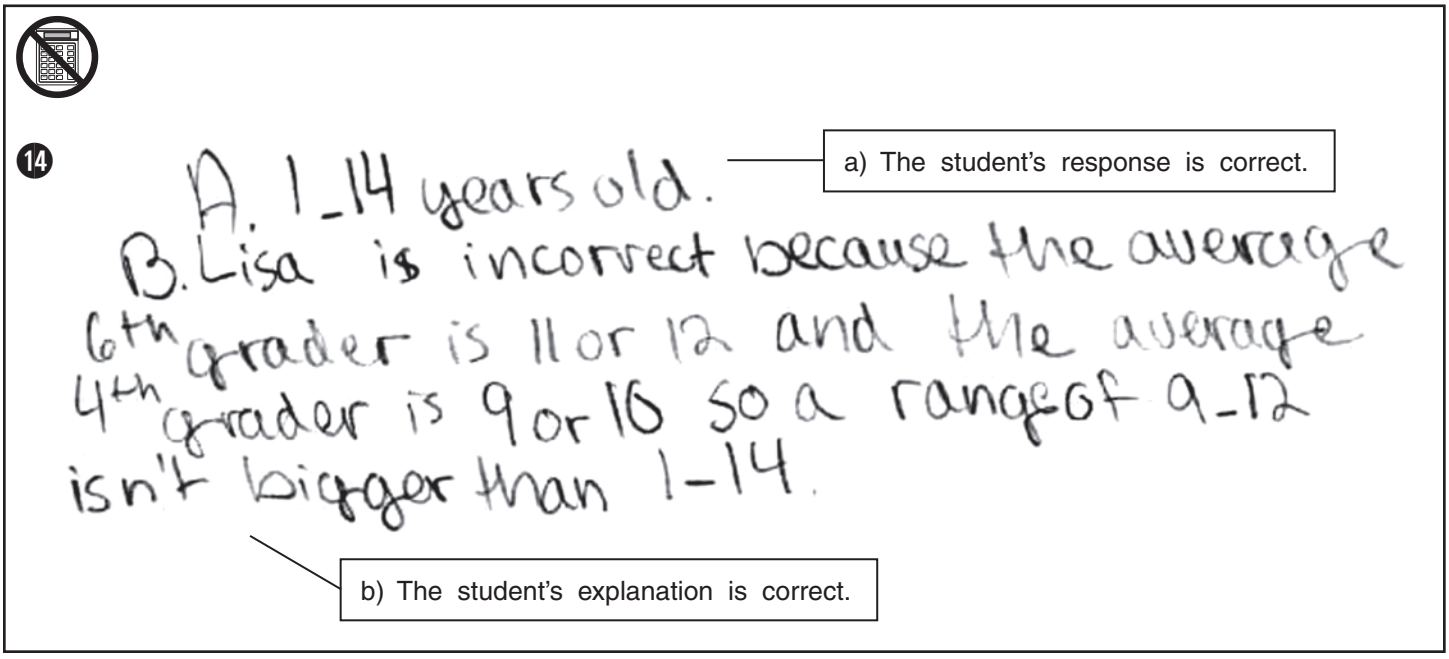
Part b: Lisa's statement is incorrect. Most of the students in a school would be between the ages of 9 and 12. So the range would be 12 – 9 = 3 years, which is less than 13 years.

Note: In part b, accept reasonable age ranges (less than 13 years) based on a school with grades 4, 5, and 6.

Score Point 2
(Example A)



Score Point 2
(Example B)



Score Point 1
(Example A)

14

A. 6-14

B. She is wrong because thier are only ages 9-12 in 4-6 grade and that is only 4 ages and their are 9 different ages at the parks.

a) The student's response is incorrect.

b) The student's explanation is correct.

Score Point 1
(Example B)

14

The range of the twelve children is 13.

14
13

a) The student's response is correct.

b) The student did not attempt.

Score Point 0
(Example A)

14

A. 9

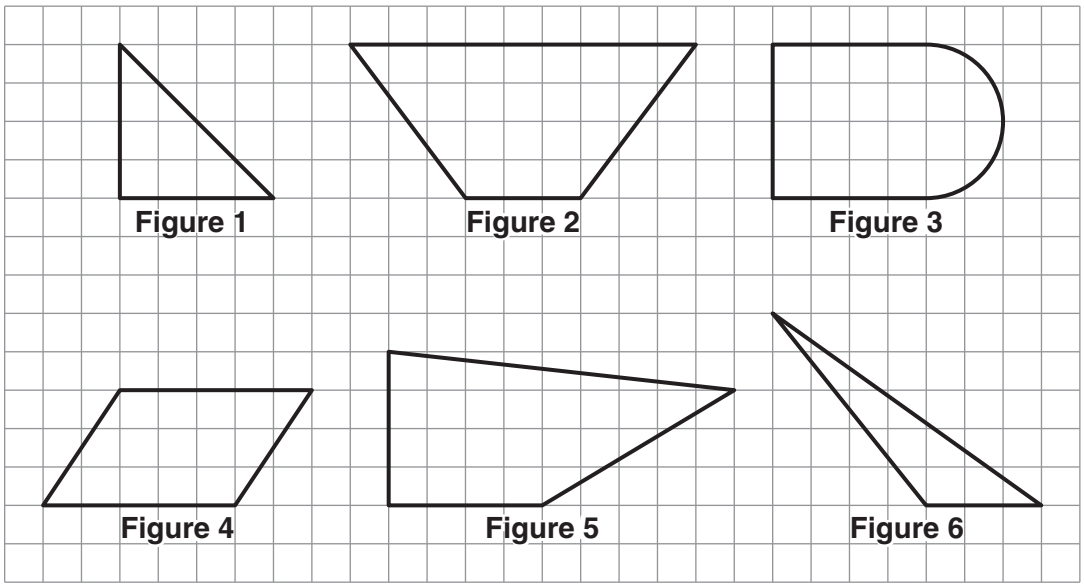
B. Incorrect Lisas School doesnt add up to the parks range

a) The student's response is incorrect.

b) The student's explanation is incorrect.

G&M 5.1 **Uses properties or attributes of angles** (right, acute, or obtuse) **or sides** (number of congruent sides, parallelism, or perpendicularity) **to identify, describe, classify, or distinguish among** different types of triangles (right, acute, obtuse, equiangular, or equilateral) or quadrilaterals (rectangles, squares, rhombi, trapezoids, or parallelograms).

15 Look at the figures on this grid.



Jill gave these three clues about one of the figures.

- Clue 1: It is a polygon.
- Clue 2: It has **exactly one** pair of congruent sides.
- Clue 3: It contains **at least one** obtuse angle.

a. Which **two** figures fit all three of Jill's clues?

b. Write a fourth clue that Jill could give so that **only one** figure would fit all four clues.

Mathew gave exactly two clues about Figure 6. Figure 6 is the only figure that fits his two clues.

c. What could be the **two** clues that Mathew gave?

Scoring Guide

Score	Description
4	4 points
3	3 points
2	2 points
1	1 point or Student shows minimal understanding of properties of polygons.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes

Part a: 1 point for correctly identifying two figures, (Figure) **2 and** (Figure) **5**

Part b: 1 point for writing a fourth clue that distinguishes between Figure 2 and Figure 5
or
for writing a correct clue based on incorrect part a

Part c: 2 points for writing two correct clues that uniquely identify Figure 6, with no incorrect clues
OR
1 point for writing two correct clues that do not uniquely identify Figure 6
or
for one correct clue with no incorrect clues

Sample Responses:

Part b: It has one pair of parallel sides.
OR
It has one right angle.

Part c: Clue 1: It has three sides.

Clue 2: It has one obtuse angle.
OR
It is a scalene triangle. [This counts as two clues.]
OR
Clue 1: It is a triangle.

Clue 2: It does not have a right angle.

SCORE POINT 4
(EXAMPLE A)

15

A. Figures 2 and 5

B. It has 1 pair of parallel sides.

C. It is a triangle. It has 1 obtuse angle.

a) The student's response is correct.

b) The student's response is correct.

c) The student gives two correct clues that uniquely identify Figure 6.

SCORE POINT 4
(EXAMPLE B)

15

a. 2, 5

b One pair of lines are parrallell

C · it is a triangle
· there are no right angles

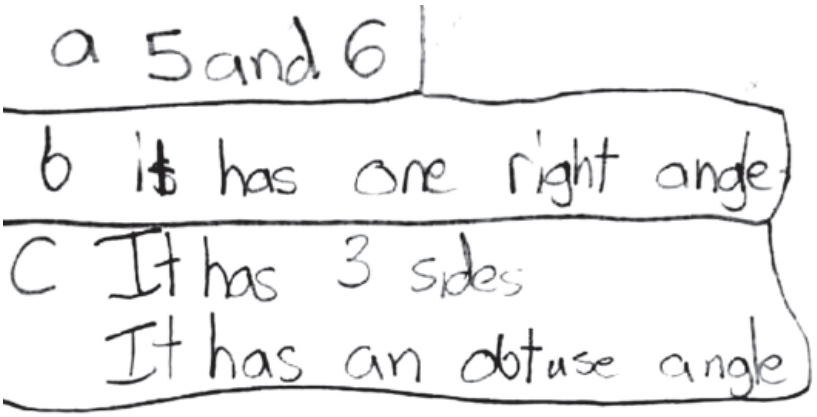
a) The student's response is correct.

b) The student's response is correct.

c) The student gives two correct clues that uniquely identify Figure 6.

SCORE POINT 3
(EXAMPLE A)

15



a) The student's response is incorrect.

b) The student's response is correct based on incorrect answer to part a.

c) The student gives two correct clues that uniquely identify Figure 6.

SCORE POINT 3
(EXAMPLE B)

15

a.) Figure 2 and Figure 5

b.) the Figure has one pair of pairilel sides.

c.) #1. it has 2 acute angles.
#2. it has one obtuse angle.

a) The student's response is correct.

b) The student's response is correct.

c) The student gives two correct clues that do not uniquely identify Figure 6.

SCORE POINT 2
(EXAMPLE A)

15

Figure 2 and Figure 4. I Know this because a polygon is a 4 sided figure and they both have 4 sides, they both have at least at least 1 obtuse angle, and they both have exactly 1 pair of congruent sides

A 4th clue could be that The are of it has to be 17 sq cm, and that would Knock out figure 2.

The 2 clues could be:
- its a triangle
- one of the angles is obtuse

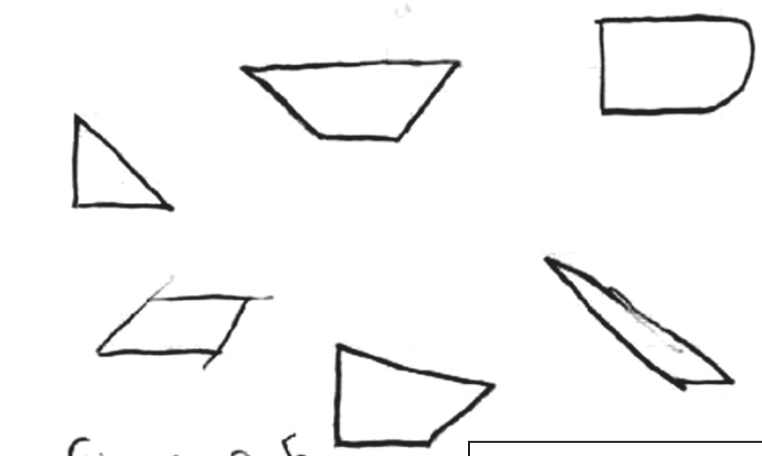
a) The student's response is incorrect.

b) The student's response is incorrect.

c) The student gives two correct clues that uniquely identify Figure 6.

SCORE POINT 1
(EXAMPLE A)

15



a. figure 2,5

b. one side has 8 squares.

a) The student's response is correct.

b) The student's response is incorrect.

c) The student does not attempt.

SCORE POINT 0
(EXAMPLE A)

15

a 4 and 2

b

all lines are same length

c 1. one strait line.

2. 2 line going to left.

a) The student's response is incorrect.

b) The student's response is incorrect.

c) The student's response is incorrect.

Grade 6 Mathematics Released Item Information

Released Item Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No Tools Allowed				✓	✓	✓			✓					✓	✓
Content Strand[1]	NO	NO	NO	NO	NO	GM	FA	FA	FA	DP	NO	GM	NO	DP	GM
GLE Code	5-1	5-2	5-3	5-4	5-4	5-3	5-1	5-3	5-4	5-1	5-1	5-6	5-1	5-2	5-1
Depth of Knowledge Code	1	1	1	2	2	2	2	1	3	2	2	1	2	2	3
Item Type[2]	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	SA	SA	SA	SA	CR
Answer Key	D	A	B	B	C	B	D	C	A	C					
Total Possible Points	1	1	1	1	1	1	1	1	1	1	1	1	2	2	4

[1]Content Strand: NO = Numbers & Operations, GM = Geometry & Measurement, FA = Functions & Algebra, DP = Data, Statistics, & Probability

[2]Item Type: MC = Multiple Choice, SA = Short Answer, CR = Constructed Response